WE CLAIM:

1. A method of enhancing the phosphorus nutrition of a plant comprising ectopically expressing in the root of a plant an isolated nucleic acid molecule encoding a phytase polypeptide for a time and under conditions sufficient for said phytase to be secreted from the root.

2. The method according to claim 1 wherein the secretion of phytase from the root is achieved by ectopically expressing the phytase as a fusion protein with a secretory signal peptide.

3. The method according to claim 2 wherein the secretory signal peptide is selected from the group consisting of the carrot extensin signal peptide and the lupin acid phosphatase signal peptide.

4. The method according to any one of claims 1 to 3 wherein the phytase polypeptide is from *Aspergillus niger.*

5. The method according to any one of claims 1 to 4 wherein the phytase polypeptide has at least about 93% identity to SEQ ID NO: 2.

6. The method according to claim 5 wherein the phytase polypeptide is selected from the group consisting of SEQ ID Nos: 2 and 4.

7. The method according to claim 5 wherein the phytase polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID Nos: 1, 3 and degenerate nucleotide sequence thereto.

8. The method according to claim 5 wherein the phytase polypeptide is encoded by a nucleotide sequence contained within the plasmid assigned AGAL Accession No. NM99/06795

9. A method of enhancing the phosphorus nutrition of a plant comprising ectopically expressing in the root of a plant an isolated nucleic acid molecule encoding a fusion polypeptide between a secretory signal peptide and a phytase polypeptide for a time and under conditions sufficient for said fusion polypeptide to be secreted from the root, wherein said isolated nucleic acid comprises a nucleotide sequence selected from the group consisting of SEQ ID Nos: 9, 11, the phytase-encoding nucleotide sequence contained in the plasmid assigned AGAL Accession No. NM99/06795, and degenerate nucleotide sequences thereto.

10. The method according to claim 9 wherein the fusion polypeptide comprises an amino acid sequence selected from the group consisting of SEQ ID Nos: 10 and 12.

11. A method comprising: (i) ectopically expressing in the root of a plant an isolated nucleic acid molecule encoding a phytase polypeptide for a time and under conditions sufficient for said phytase to be secreted from the root; and (ii) modifying the chemistry of the soil around the root or other growth medium around the root using an organic acid.

12. The method according to claim 11 wherein the organic acid is citric acid.

13. The method according to claims 11 or 12 wherein the secretion of phytase from the root is achieved by ectopically expressing the phytase as a fusion protein with a secretory signal peptide.

14. The method according to claim 13 wherein the secretory signal peptide is selected from the group consisting of the carrot extensin signal peptide and the lupin acid phosphatase signal peptide.

15. The method according to any one of claims 11 to 14 wherein the phytase polypeptide is from *Aspergillus niger*.

16. The method according to any one of claims 11 to 15 wherein the phytase polypeptide has at least about 93% identity to SEQ ID NO: 2.

17. The method according to claim 16 wherein the phytase polypeptide is selected from the group consisting of SEQ ID Nos: 2 and 4.

18. The method according to claim 17 wherein the phytase polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID Nos: 1, 3 and degenerate nucleotide sequence thereto.

19. The method according to claim 17 wherein the phytase polypeptide is encoded by a nucleotide sequence contained within the plasmid assigned AGAL Accession No. NM99/06795.

20. A method comprising: (i) ectopically expressing in the root of a plant an isolated nucleic acid molecule encoding a fusion polypeptide between a secretory signal peptide and a phytase polypeptide for a time and under conditions sufficient for said fusion polypeptide to be secreted from the root, wherein said isolated nucleic acid comprises a nucleotide sequence selected from the group consisting of SEQ ID Nos: 9, 11, a phytase-encoding nucleotide sequence contained within the plasmid assigned AGAL Accession No. NM99/06795, and degenerate nucleotide sequences thereto and (ii) modifying the chemistry of the soil around the root or other growth medium around the root using an organic acid.

21. The method according to claim 20 wherein the organic acid is citric acid.

22. The method according to claims 20 or 21 wherein the fusion polypeptide comprises an amino acid sequence selected from the group consisting of SEQ ID Nos: 10 and 12.

23. The method according to any one of claims 11 to 22 when used to enhance the phosphorus nutrition of a plant or the growth of a plant on a phosphorus source comprising phytate and/or increase the phosphorus content of a plant.

24. The method according to any one of claims 11 to 22 when used to enhance the biomass produced by a plant .

25. The method according to any one of claims 11 to 22 when used to enhance the rate of hypocotyl production or the rate of epicotyl production.

26. A transformed plant that ectopically expresses a secretable phytase polypeptide in its roots wherein said phytase polypeptide is secreted from the roots of said plant, wherein said plant is produced by a process comprising performing the method according to any one of claims 1 to 25.

27. Progeny of the transformed plant of claim 26 wherein said progeny ectopically expresses a secretable phytase polypeptide in its roots wherein said phytase polypeptide is secreted from the roots of said plant.

28. The transformed plant of claim 26 wherein said plant grows on a phosphorus source comprising phytate more efficiently than an isogenic plant that does not ectopically express the phytase enzyme.

29. The progeny of claim 27 wherein said progeny grows on a phosphorus source comprising phytate more efficiently than an isogenic plant that does not ectopically express the phytase enzyme.

30. The transformed plant of claims 26 or 28 wherein said plant exhibits a larger biomass than an isogenic plant that does not ectopically express the phytase enzyme when grown on a phosphorus source comprising phytate.

31. The progeny of claims 27 or 29 wherein said progeny exhibits a larger biomass than an isogenic plant that does not ectopically express the phytase enzyme when grown on a phosphorus source comprising phytate.

32. The transformed plant of claims 26 or 28 wherein said plant exhibits an enhanced rate of epicotyl or hypocotyl production than an isogenic plant that does not ectopically express the phytase enzyme when grown on a phosphorus source comprising phytate.

33. The progeny of claims 27 or 29 wherein said progeny exhibits an enhanced rate of epicotyl or hypocotyl production than an isogenic plant that does not ectopically express the phytase enzyme when grown on a phosphorus source comprising phytate.

34. A process comprising producing a plant that ectopically expresses phytase in secretable form in its roots or a progeny of said plant that expresses said phytase in secretable form and growing said plant or progeny in a plant growth medium comprising phytate and a suitable carrier for application to plants and/or the growth medium.

35. The process according to claim 34 further comprising modifying the chemistry around the root of the plant or progeny using an organic acid.

36. The process according to claim 35 wherein the organic acid is citric acid.

37. The process according to any one of claims 34 to 36 wherein the secretion of phytase from the root is achieved by ectopically expressing the phytase as a fusion protein with a secretory signal peptide.

38. The process according to claim 37 wherein the secretory signal peptide is selected from the group consisting of the carrot extension signal peptide and the lupin acid phosphatase signal peptide.

39. The process according to any one of claims 34 to 38 wherein the phytase polypeptide is from *Aspergillus niger*.

40. The process according to any one of claims 34 to 39 wherein the phytase polypeptide has at least about 93% identity to SEQ ID NO: 2.

41. The process according to claim 40 wherein the phytase polypeptide is selected from the group consisting of SEQ ID Nos: 2 and 4.

42. The process according to claim 40 wherein the phytase polypeptide is encoded by a nucleotide sequence selected from the group consisting of SEQ ID Nos: 1, 3 and degenerate nucleotide sequences thereto.

43. The process according to claim 5 wherein the phytase polypeptide is encoded by a nucleotide sequence contained within the plasmid assigned AGAL Accession No. NM99/06795.

44. An isolated nucleic acid molecule encoding a mature phytase polypeptide without a phytase leader sequence and comprising a nucleotide sequence selected from the group consisting of: (i) the nucleotide sequence of SEQ ID NO: 1 or 9; (ii) a nucleotide sequence encoding the amino acid sequence of SEQ ID NO: 2 or 10; and (iii) a sequence that hybridises to a phytase-encoding nucleotide sequence contained within the plasmid assigned AGAL

Accession No. NM99/06795 or a complementary nucleotide sequence thereto under high stringency hybridisation conditions.

45. The isolated nucleic acid molecule of claim 44 comprising the nucleotide sequence set forth in SEQ ID NO: 1 or 9.

46. A gene construct comprising the isolated nucleic acid molecule according to any one of claims 44 or 45 placed operably in connection with a promoter sequence that is operable in the root cells of a plant.

47. The gene construct of claim 46 comprising the *PhyA-2* chimeric gene sequence set forth in SEQ ID NO: 1.

48. The gene construct of claim 46 comprising the *ext::PhyA-2* sequence set forth in SEQ ID NO: 9.

49. The gene construct according to claim 46 consisting of the plasmid assigned AGAL Accession No. NM99/06795 .